



Organic ice resists: effect of electron beam irradiation on frozen hydrocarbons

Elsukova, Anna; Han, Anpan; Beleggia, Marco

Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Elsukova, A., Han, A., & Beleggia, M. (2018). *Organic ice resists: effect of electron beam irradiation on frozen hydrocarbons*. Abstract from The 13th meeting of the "Ionizing Radiation and Polymers" symposium, Moscow, Russian Federation.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

ORGANIC ICE RESISTS: EFFECT OF ELECTRON BEAM IRRADIATION ON FROZEN HYDROCARBONS

Anna Elsukova¹, Anpan Han¹, and Marco Beleggia¹

¹*DTU Danchip/CEN, Technical University of Denmark, 2800, Kongens Lyngby, Denmark*

annaels@dtu.dk

Organic Ice Resist Lithography (OIRL) is a novel one-step method for patterning nanostructures using a thin frozen layer of beam sensitive organic material [1]. The organic vapor is introduced into the lithography instrument and condenses into a thin layer of ice on the substrate, which is held at cryogenic temperature. After exposure to the scanning electron beam, the substrate is heated up to room temperature and unexposed ice sublimates (Fig 1 (a)). Exposed areas are transformed into non-volatile product by the electron beam and remain on the substrate. In order to understand beam exposure mechanism in organic ices, we have patterned simple linear hydrocarbons (N-alkanes) with different molecular weights (Fig 1(b)) in an environmental transmission electron microscope (ETEM) operated at 80 kV in scanning mode. The experiments revealed that the feature size depends on the precursor molecular weight. Coupling this result with the experimental contrast curves of each precursor (exposed thickness vs. dose) led to a model connecting crosslinking in exposed ice and its phase transformation from volatile to non-volatile state.

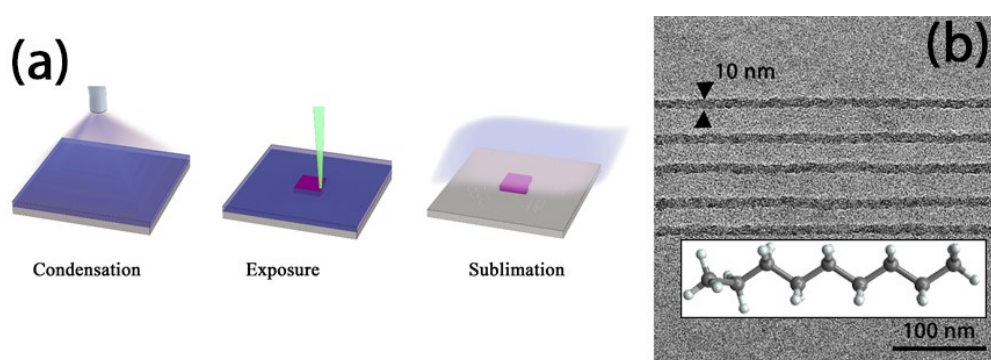


Figure 1. (a) General principle of OIRL. (b) Patterned 10-nm lines on n-nonane organic ice.

References:

- [1] W. Tiddi *et al.*, Nano Letters **17**, 7886 (2017)